Prepared For:
Cottman Avenue PRP Group

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US Environmental Protection Agency
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Prepared By:
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Boston, Massachusetts

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METAL BANK SHEETPILE WALL REPAIR CONSTRUCTION CERTIFICATION REPORT

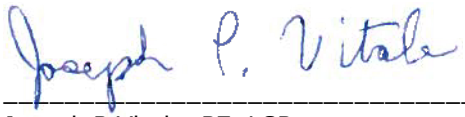
METAL BANK COTTMAN AVENUE SUPERFUND SITE PHILADELPHIA, PENNSYLVANIA

RAMBOLL ENVIRON

SIGNATURE AND CERTIFICATION STATEMENT

We certify that, to the best of our professional knowledge and belief, the information contained in or accompanying this submission is true, accurate, and complete.

Nicholas Steenhaut, PE
Senior Manager



Joseph P Vitale, PE, LSP
Principal Consultant

CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

AASHTO:	American Association of State Highway and Transportation Officials
AMSL:	Above Mean Sea Level
CY:	Cubic Yards
CEI:	Creamer Environmental Services, Inc.
EPA/USEPA:	US Environmental Protection Agency
HASP:	Health and Safety Plan
LNAPL:	Light Non-Aqueous Phase Liquid
LTM:	Long-Term Monitoring
NPL:	National Priorities List
NTU:	Nephelometric turbidity unit
PCB:	Polychlorinated biphenyl
PE:	Professional Engineer
PENNDOT:	Pennsylvania Department of Transportation
PPE:	Personal Protective Equipment
R6:	AASHTO R6 size riprap stone
Ramboll Environ/RE:	Ramboll Environ US Corporation (formerly ENVIRON International Corporation (ENVIRON)
SMAW:	Shielded metal arc welding
USACE:	US Army Corps of Engineers
UST:	Underground Storage Tank
WPS:	American Welding Society's Welding Procedure Specification

1. INTRODUCTION

1.1 Site and Project History

This Construction Certification Report summarizes and documents the sheetpile wall repair construction activities completed at the Metal Bank Superfund Site (the "Site"), located at 7301 Milnor Street in Philadelphia, Pennsylvania between May 2 and July 13, 2016. Construction was performed in accordance with Design Drawings (see **Figures 1 to 4**) and specifications prepared by RA Consultants and Contractor Submittals approved by Ramboll Environ, RA Consultants, and the U.S. Environmental Protection Agency (EPA). The major components of the work activities involved performing repairs of a waler on the sheetpile wall and installing a stone berm along the waterfront side of the wall to structurally stabilize this component of the remedy.

The Site was historically used for the storage and reclamation of various scrap metals from 1962 until 1979, with scrap metal storage possibly continuing until 1984 or 1985. Fluids collected during electrical transformer salvage operations at the Site were reportedly routed to a concrete catch basin connected to an underground storage tank (UST). In 1972, the UST reportedly ruptured and transformer oil containing polychlorinated biphenyls (PCBs) was released to the Delaware River. The Site was added to the National Priorities List (NPL) in September 1983, and EPA issued a Record of Decision specifying the selected remedial approach in December 1997. Following the adoption of three consent decrees in March 2006, a revised final design specifying the details of the cleanup activities was approved by EPA (with comments) in February 2008. The remediation, including the installation of the sheetpile wall, was performed between July 2008 and March 2010. At that time, contaminated soil and sediment were excavated and soil and sediment caps were installed. The remediation activities also involved the construction of a light non-aqueous phase liquid (LNAPL) interceptor trench and the removal and closure of several underground storage tanks (USTs).

Following the completion of the remediation activities in 2010, a long-term monitoring (LTM) program was initiated on July 1, 2010, which included monitoring of groundwater, biological activity, and the condition of the soil and sediment caps, the LNAPL trench, and the sheetpile wall. Further details of the LTM activities can be found in the most recent *Long-Term Monitoring Annual Report* (Ramboll Environ, 2016). It was during these LTM activities that movement of the sheetpile wall system and the failure of one of the walers in Zone 2 of the sheetpile wall were identified, prompting a series of geotechnical and structural evaluations, and, ultimately, the construction and repair activities described in this document.

1.2 Scope

Waler repair activities were proposed to address observed damage to the walers along Zone 2 in the sheetpile wall. Construction of a riprap stone berm was proposed to stabilize the wall and to reduce the risk of future occurrences of structural failures. **Figures 1 through 4** describe the key components of the construction design. The work activities were completed between May 2, 2016 and July 13, 2016 over 47 work days. The final inspection was conducted on July 13, 2016 and was attended by Ramboll Environ, the EPA, the Utility group, and CDM Smith. This Construction Certification Report provides a single reference source for key project documentation, including record drawings, quality control test results,

material importation and waste disposal records, design changes, and daily construction activities.

This report contains the following major sections:

- Section 2: Roles and Responsibilities.
- Section 3: Project Administration.
- Section 4: Health and Safety.
- Section 5: Construction Activities.
- Section 6: Long-Term Monitoring.
- Section 7: Contact Information.

The Roles and Responsibilities section of the report identifies the project participants. The Project Administration section identifies the project documentation utilized to manage the daily construction activities, document approved changes or deviations from the approved design plans, present technical documentation supporting specific elements of the waler repair construction, and document as-built conditions. The Health and Safety section details the parties responsible for different aspects of health and safety during the implementation of the construction activities. The Construction Activities section discusses the implementation of the construction activities and design changes. The report concludes with a summary of LTM activities and identification of project contacts.

2. ROLES AND RESPONSIBILITIES

Table 1 below identifies the parties involved in the design and implementation of the proposed activities.

Table 1: Roles and Responsibilities

Company	Roles and Responsibilities
Cottman Avenue PRP Group (Utility Group)	Potentially Responsible Parties
Ramboll Environ US Corporation	Construction manager
RA Consultants	Contractor to Ramboll Environ serves as design engineers for the repair activities
Creamer Environmental, Inc. (CEI)	Construction general contractor
U.S. Environmental Protection Agency (EPA)	Project lead regulatory agency
US Army Corps of Engineers (USACE)	Federal support agency to the EPA for construction oversight pertaining to structural issues
CDM Smith (CDM)	Contractor to the EPA for general construction oversight
Louis J Weber and Associates, Inc. (Weber)	Subcontractor to CEI as licensed professional surveyor responsible for land survey and monitoring sheetpile wall movement
Aqua Survey, Inc.	Subcontractor to CEI as licensed professional surveyor responsible for bathymetric survey
Apex Rentals, Inc. (Apex)	Subcontractor to CEI as fencing contractor
ANS Consultants, Inc. (ANS)	Subcontractor to CEI responsible for tie-rod testing
Thackray Crane Rental, Inc.	Subcontractor to CEI as crane rental company
H&K Materials (H&K)	Subcontractor to CEI as source of R6 stone and trucking company
Enviroscapes, Inc. (Enviroscapes)	Subcontractor to CEI as vegetation restoration company

3. PROJECT ADMINISTRATION

3.1 Contractor Submittals and Design Package

Construction activities were performed in accordance with the design drawings and specifications drafted by RA Consultants and CEI and approved by the EPA. Deviations from the approved submittals were documented in daily reports prepared by Ramboll Environ, in **Appendix D**, and in **Section 5** of this report. A submittal log and the final approved submittal files are included with this report in **Appendix A**. A description of the activities completed is provided in **Section 5**.

3.2 Daily Reports

Ramboll Environ prepared daily reports of activities performed on-site. These daily reports include information about personnel on-site, weather conditions, health and safety briefings, equipment usage, material deliveries, materials removed from the Site, monitoring data, quality assurance/quality control information, subcontractor certifications, progress summaries, issues encountered, as well as a summary of activities completed each day. The daily reports were shared with project stakeholders at the end of each day, and are included in **Appendix D**.

3.3 Rock Aggregate Material Tracking Documentation

Stone used for berm construction was sourced from the H&K Birdsboro Quarry located in Birdsboro Township, PA. Geotechnical properties of the stone are described in Submittal 6.3 (Materials) of **Appendix A**. The H&K Birdsboro Quarry was approved by USACE.

AASHTO No. 3 crushed stone, also from Birdsboro Quarry, was used for the construction of crushed stone pads for stockpiling of R6 stone to prevent equipment from damaging the engineered cap.

Table 2 below summarizes the quantity of rock aggregate materials imported to the Site

Table 2: Imported Rock Aggregate Material Summary

Material Designation	Source	Imported Quantity (tons)	Use
R6 Stone	H&K Group Birdsboro Quarry	5059.61	Stone berm construction
Washed crushed stone (AASHTO No. 3)	H&K Group Birdsboro Quarry	133.93	Construction of two temporary crushed stone pads for R6 stone stockpile placement

All imported rock aggregate material was delivered to the Site via truck. All the crushed stone was imported on May 4, 2016, and the R6 stone was imported between May 9 and June 10, 2016. Ramboll Environ tracked the delivery information for each load of imported

material delivered, which is summarized in the material tracking log included in **Appendix F**. Copies of the material delivery tickets are also provided in **Appendix F**.

3.4 Disposal Documentation

During R6 stone delivery on May 11, 2016, one of the hauling trucks operated by H&K Trucking Company experienced a leak in the fuel line, which resulted in spillage of a small amount of diesel oil onto the asphalt-paved staging area near the Site entrance. As described in Ramboll Environ's daily report for May 11, 2016 (**Appendix D**), this spill was soaked up with absorbent pads and Speedy Dry™ (an all-purpose oil absorbent) by CEI and H&K Materials and the cleanup materials were contained in a five-gallon plastic bucket for eventual off-site disposal on June 15, 2016. The waste disposal manifest for this material is provided in **Appendix G**. This spill did not constitute a reportable release under the state regulations.

3.5 As-Built Drawings

Throughout the implementation of the construction activities, surveying was performed by the licensed surveyor in accordance with Submittal #10.2 (Rip Rap Elevation Survey Plan) and Submittal #9.3 (Monitoring Plan). CEI submitted drawings and other survey records prepared by the licensed surveyor to Ramboll Environ, confirming that the work activity was completed in accordance with the design drawings and specifications. Full survey data, including baseline, bi-weekly, and final as-built data, are provided here in **Appendix B**.

4. HEALTH AND SAFETY

CEI served as the Site Manager for the construction activities. As the Site Manager, CEI's main responsibilities included:

- H&S oversight of CEI personnel on-site.
- Providing initial Site orientation training to new staff, contractors, and visitors.
- Monitoring Site access.

Direct responsibility for employee safety was retained by each contractor. The contractors' responsibilities included:

- Preparing a Site-specific HASP and written safety procedures.
- Conforming to CEI's health and safety procedures.
- Ensuring that each employee was included in a medical surveillance program.
- Conducting a health and safety tail-gate meeting at the start of each work day.
- Providing Personal Protective Equipment (PPE), as needed.
- Monitoring employee compliance with Site and contractor safety rules.
- Conducting an incident investigation and providing an incident report to Site H&S in the event of an employee injury, property damage, or near miss incident. No incidents took place during this construction project.

As the Construction Manager, Ramboll Environ's responsibilities included:

- Preparing and updating the Ramboll Environ HASP.
- H&S oversight of Construction Management personnel on-site.
- Conforming to CEI's health and safety procedures.
- Maintaining Ramboll Environ employee training and medical surveillance records.

There were no OSHA recordable incidents during the course of the project implementation.

5. CONSTRUCTION ACTIVITIES

The construction activities were conducted between May 2, 2016 and July 12, 2016. The performance of the construction activities was documented in daily reports prepared by Ramboll Environ. The following sections provide details of various construction activities completed and field modifications to the design. Drawings presenting the as-built conditions are provided in **Appendix B** and daily construction reports are included in **Appendix D**. A photographic log highlighting the key work activities is provided in **Appendix C**.

5.1 Project Construction Implementation

Site mobilization began on May 2, 2016 when CEI removed the permanent fencing along the work area and installed temporary fencing along the sheetpile wall. CEI began stone placement on May 10, 2016 and completed the placement activities on June 20, 2016 over 26 work days. Turbidity monitoring during stone placement did not exceed the performance criteria throughout the duration of the stone-placement activities (see **Appendix B**). Waler repair activities were initiated on June 1, 2016 after the work platform setup in the Zone 2 repair area was completed. The union dock workers hired by CEI completed the repair within 23 work days, on June 30, 2016. Tie-rod testing was performed between June 27 and 29, 2016 on all five tie-rods within the repair area and on five additional tie-rods outside that area of the wall. No issues were found at any of the test locations. Site restoration began on June 30, 2016. A pre-final inspection was performed on July 6, 2016, after which CEI performed minor touch-up epoxy applications along the waler within the repair area. Final restoration seeding was conducted on July 12, 2016 and the final inspection was conducted on July 13, 2016. No issues were identified during the final inspection.

5.2 Mobilization, Site Preparation, and Baseline Survey

CEI mobilized to the Site between May 2 and May 11, 2016. During this period, CEI performed the following activities:

- Set up a temporary trailer and associated temporary facilities per Submittal #3.3 (Sequence of Work and Construction Schedule) and Submittal #5.3 (Vegetation Protection Plan).
- Installed temporary fencing along the bulkhead and then removed the permanent fencing per Submittal #3.3 (Sequence of Work and Construction Schedule). In addition to providing fall protection and Site security, the temporary fence also delineated the area where equipment for material placement was not allowed. This fencing was situated at least 40 feet away from the sheetpile wall in Zones 1 and 2 and at least 44 feet away from the wall in Zone 3.
- Mowed and trimmed vegetation as needed, per Submittal #3.3 (Sequence of Work and Construction Schedule).
- Performed baseline survey of the upland area per Submittal #9.3 (Monitoring Plan) and Submittal #3.3 (Sequence of Work and Construction Schedule). Additional permanent survey prisms were installed along the sheetpile wall at locations designated in **Drawing 2** of Submittal #9.3 (Monitoring Plan) to supplement the eight (8) existing survey monitoring prisms (Targets A through H).

- Performed baseline bathymetric survey in the stone berm placement area and its vicinity per Submittal #9.3 (Monitoring Plan) and Submittal #3.3 (Sequence of Work and Construction Schedule).
- Installed orange barrier fence around existing vaults and monitoring wells in the upland area.
- Imported and installed timber mats (i.e., Reese mats) along construction access road at locations designated in Submittal 5.3 (Vegetation Protection Plan).
- Mobilized the following equipment:
  - CASE CX250C Long Reach Excavator.
  - CASE 821F Loader.
  - CAROLINA SKIFF 19DL.X Boat.
- Imported 133.93 tons (six loads) of 2-inch crushed stone and created two temporary crushed stone pads for stockpiling of R6 stone as per Submittal #5.3 (Vegetation Protection Plan). Both stone pads were at least six inches thick to prevent equipment from damaging the engineered cap during stone placement activities.
- Began importation of R6 stone to prepare for stone placement after the bathymetric survey was completed.
- Installed turbidity curtain in Phase I configuration as per Submittal #11.3 (Turbidity Control Plan).

A representative from the Philadelphia Water Department was on-site on May 2, 2016 to provide CEI and Ramboll Environ access to the main gate, during which time CEI and Ramboll Environ also daisy-chained locks to the Water Department lock to allow Site access to all three parties. The Philadelphia Water Department also photo-documented existing conditions at the combined sewer overflow outfall area and the main road. Ramboll Environ also photo-documented existing conditions across the Site during this time.

An American 9310 lattice-boom crane was on-site between May 11 and June 20, 2016 to assist with stone placement. The crane was assembled and disassembled at the Site. Due to the crane's size and operating range, an additional row of timber mats were installed along the construction access road throughout the period the crane was on-site to provide additional protection for the vegetative soil cap.

5.3 Installation of Riprap and Turbidity Monitoring

Following the turbidity curtain installation in its Phase I configuration on May 10, 2016, riprap placement began. The early stages of stone placement focused on building up the R6 berm in the area where the waler had failed. This was done so that waler repair activities could start while stone placement continued in other areas along the sheetpile wall. A portion of the R6 berm in the area where the waler had failed was designated as a temporary berm on the design drawings (Figure 2), but was left in place following completion of the project based on a cost-benefit analysis. Stone placement within the Phase I configuration of the turbidity curtain, encompassing all of Zone 1 and a portion of Zone 2 of the sheetpile wall, was completed around May 27, after which the turbidity curtain was moved to the Phase II configuration, encompassing the remainder of the sheetpile wall.

Stone placement was performed using the long-reach excavator and the crane. During placement, the equipment was situated behind the temporary fence, set back from the sheetpile wall, and the boom reached over beyond the sheetpile wall for stone placement.

Stone placement in Zone 1 was performed exclusively using the long-reach excavator, stone placement in Zone 2 was performed predominately using the crane, and stone placement in Zone 3 was performed exclusively with the crane. CEI replaced the clamshell bucket crane attachment with a grapple crane attachment on May 20, 2016, in order to increase stone placement rate as the clamshell bucket could only pick up one or two R6 stones at a time. A total of 5,059 tons of riprap stone was placed over 29 work days. Estimated production rates typically ranged from approximately 100 to 380 tons per day.

Surveying was performed to monitor stone berm placement progress twice a week, on the same schedule as the surveying to monitor sheetpile wall movement.

Turbidity monitoring throughout the stone placement activities was performed according to the Turbidity Control Plan specified in Submittal #11.3. Monitoring was performed every two hours except during low tide on the first day of stone placement in each work zone and at least twice a day on subsequent days. These measurements were obtained by CEI using the submersible 90-degree scatter nephelometer specified in the Submittal from a boat at the upgradient, the downgradient, and the intermediate monitoring locations indicated in **Drawing 2** of the Submittal. As specified in the Submittal, the performance criteria used to determine whether stone placement was causing elevated downgradient turbidity was a threshold value 15% or 35 NTU higher than upgradient turbidity, whichever was greater. Turbidity results did not exceed the performance criteria throughout the implementation of the stone placement activities.

5.4 Repair of Waler

Welding was performed by union dock builders hired by CEI. The waler repair activities were completed in accordance with **Figures 1 through 4**, Submittal #7.2 (Waler Repair Sequence and Procedures), and Submittal #8.2 (Waler Repair Shop Drawings). Any deviations from these documents are described in **Section 5.8**. Welder qualifications and certifications are provided in **Appendix E-2**.

Waler repair material, including new waler sections and HP8 support brackets, were delivered to the Site on May 27, 2016. This material was pre-coated with a minimum of 16 mil epoxy in order to maintain corrosion protection following installation. Shims, chairs, brackets, and other steel material necessary to assist with waler repair and installation were fabricated from suitable portions of the removed waler section. In any location where welding took place, the epoxy coating was removed using a handheld grinder to expose a safe welding surface two inches from each side of the outside lines of the weld, in accordance with **Figure 1**.

As described in **Section 5.3** above, prior to commencement of waler repair activities, CEI installed a 5-foot wide bench of R6 material in Zone 2 around the repair area to create a safe work platform for welding. Once R6 material was placed around the repair area, two 5-foot by 24-foot wooden float stages were placed on top of the R6 material work platform and anchored to the sheetpile wall via steel cables attached at one end to the float stages and

the other end to approximately 1-inch diameter temporary holes installed near the top of the sheetpile wall. The work platform was completed on May 31, 2016 and active waler repair work on the platform began on June 1, 2016.

The dock welders began waler repair activities with removal of the damaged section of the double-channel waler, which was located near Target E, between tie-rods T-23 and T-25. The replacement waler was installed as two separate sections, one approximately 27-feet long and the other 7.5-feet long. Both sections were fabricated on-site to the appropriate length and beveled to fit the corner as described in **Figure 3**. Welding was performed in accordance with **Figures 1 through 4**, applicable submittals, and the American Welding Society's Welding Procedure Specification (WPS) for a Single Groove Weld as documented on the WPS form provided in Submittal #7.2.

The waler was welded into place using full penetration welds on the ends and at the corner, connecting the new and existing double channel sections to form one continuous waler. Temporary waler support chairs were installed to assist with installation of the new waler section. Chairs that could not be removed safely were allowed to remain in place and were trimmed back so as not to protrude beyond the waler and HP8 support bracket. Tack welding was performed with the same type of electrode and was incorporated into the final weld. The new waler was shimmed as necessary to provide full contact between the waler and sheetpile wall. At each contact point, the waler and shims were welded directly to the sheetpile wall with 5/16" welds using 5/32" or 1/8" filler rods.

Following final welding, the waler was anchored into place with the existing plates on the tie-rods as well as new HP8 support brackets, which were installed to help hold the added weight of the channel system at the corner of the sheetpile wall. A total of four HP8 segments were installed in front of the waler: one segment was installed in front of the undamaged waler west of the repair area between T-22 and T-23, one segment was installed along the replaced waler between T-23 and T-24, one segment was installed at the corner of the repaired waler between T-24 and T-25, and the last segment was installed just north of the repair area between T-25 and T-26. The HP8 segments were attached to the waler using 5/16" welds on the top and bottom of the segment at a frequency of 2" every 6" along the length of each segment. To allow for the waler to drain, 1" diameter holes were installed 10' on center through the web of the HP8 waler.

Final welding of the waler and HP8 segments was inspected and approved by USACE and RA Consultants during the pre-final inspection on July 6, 2016. CEI applied coal tar epoxy to welds and other exposed steel visible in the repair area in order to restore corrosion protection.

5.5 Proof Testing of Anchors

Tie-rod testing was conducted by ANS between June 27 and June 29, 2016, in accordance with Submittal #12 (Tie-Rod Testing Qualifications), which involved incrementally loading the anchors and checking to make sure test step loads could be maintained over set durations. All five tie-rods in the repair area (T-22 through T-26) and five additional tie-rods outside of the repair area (T-5, T-9, T-14, T-26, T-28, and T-39) were tested. All tested tie-rods were locked off at the design load shown on **Figure 2**. Tie-rod testing in the repair area was conducted on the wooden float stages described in the previous section. At other

test locations, CEI constructed temporary work platforms by stacking timber mats on top of the stone berm. These mats were immediately removed after testing was completed at each location.

Official test results and equipment calibration certifications and specification sheets are provided in **Appendix E**. The tests conducted passed the design specifications, since the test step loads were maintained during all tests conducted, and the total creep movement between 1 and 10 minutes did not exceed 0.040 inches.

5.6 Restoration and As-Built Survey

As previously noted, the upland area of the Site consists of a vegetated, engineered soil cap and a perimeter chain-link fence. Following construction activities vegetated areas disturbed by material stockpiles, construction traffic, and timber mat placement were regraded in preparation for revegetation efforts and reinstallation of the perimeter fence in accordance with Submittal # 3.3 (Sequence of Work and Construction Schedule) and Submittal #5.3 (Vegetation Protection Plan).

On June 27, 2016, following final survey confirmation of R6 material placement, CEI removed timber mats that had been placed in equipment staging and storage areas at the end of the Site access road. Once all equipment and timber mats were removed from the area immediately upland from the berm, restoration efforts were conducted. CEI removed the crushed stone material storage pads and placed this material onto the R6 berm during periods in the tidal cycle when the top of the berm was above water. Afterwards, the upland area was regraded, including restoration of a perimeter berm located approximately 30 feet upland from the sheetpile wall.

From July 6 to July 9, 2016, Apex removed the temporary fencing and completed reinstallation of permanent fencing along the perimeter of the Site, in accordance with Submittal #3.3 (Sequence of Work and Construction Schedule). On July 12, 2016, Enviroscapes regraded disturbed areas, hydroseeded with a native seed mix supplemented with rye, and mulched the restored areas with straw.

A total of 8 permanent and 19 temporary targets (Target #100 through #126) along the sheetpile wall were surveyed by Weber prior to the start and periodically throughout construction and repair activities in accordance with Submittal #9.3 (Monitoring Plan). A final as-built survey was completed on June 29, 2016, which confirmed that the repair activities did not significantly alter conditions at the Site; 22 of the 27 total targets showed no detectable difference between their May 9, 2016 baseline survey locations and their final survey locations. Targets which did show a measurable change of 0.5” or greater between original and final surveyed location were located at the corner where the waler repair took place—Target 105 (Target D), Target 109, Target 110 (Target E), Target 111, and Target 112. The bulk of the movement in this area of the wall occurred immediately following the de-tensioning of the tie-rods in this area. Full survey data, including baseline, bi-weekly, and final as-built data is provided in **Appendix B**. The 8 permanent targets will continue to be surveyed as part of the LTM plan for the Site to monitor the sheetpile for movement.

5.7 Demobilization

Site demobilization activities took place in stages, as key parts of the construction and waler repair tasks were completed. On June 24, 2016, after RA Consultants provided final confirmation that R6 material placement along the berm was complete, the crane was used to disassemble and remove the turbidity curtain. Once the turbidity curtain was removed, CEI began disassembly and demobilization of the crane. By June 27, 2016, the crane was fully demobilized from the Site. With the crane off-site, CEI continued demobilization efforts, including utilizing the front-loader and long-reach excavator to stockpile timber mats, gather crushed stone storage pad material, and regrade areas of the Site that were ready for final restoration.

Following completion of the tie-rod proof testing on June 29, 2016, the boat and float stages for the welding platform, the welding equipment, and turbidity boom were demobilized from the Site. Demobilization of timber mats began on July 6, 2016 and was completed on July 12, 2016. On July 7, 2016, following completion of the pre-final Site inspection, both the front-loader and long-reach excavator were demobilized from the Site. The site trailer was demobilized on July 12, 2016.

The final Site inspection took place on July 13, 2016 and remaining equipment was demobilized from the Site at that time, including the water cooler, porta-toilets, and trash dumpster. CEI removed their locks from the daisy chains at the Site access gate and the right-of-way gate, leaving the right-of-way accessible to Ramboll Environ and the Philadelphia Water Department, and the Site accessible to only Ramboll Environ.

5.8 Field Changes to Design

At various points during the construction activities, minor design or specification changes were made in the field, as indicated in **Table 3**. These changes are considered non-material and do not affect the effectiveness of the remedy. Email communications documenting approval of these changes are provided in **Appendix H** unless otherwise noted below.

Table 3: Field Changes to Design

Design Change	Daily Report	Approved By
1. Temporary flush-mounted survey prisms (targets) were used instead of the three-dimensional targets proposed in Submittal #10.2 (Rip Rap Elevation Survey Plan) (Section 5.1).	5/9/2016	EPA
2. The frequency of surveying stone placement progress was changed from every two days, as proposed in Submittal #10.2 (Rip Rap Elevation Survey Plan), to a minimum of twice a week (Section 5.3), to coincide with the surveyor's sheetpile monitoring schedule.	Throughout stone placement activities (5/10 to 06/20/2016)	EPA

Table 3: Field Changes to Design

Design Change	Daily Report	Approved By
3. CEI periodically monitored the height of the excavator bucket and the crane grapple attachment during stone placement in lieu of having incremental measurements marked off to confirm elevations, as indicated in Submittal #10.2, Rip Rap Elevation Survey Plan (Section 5.3). Final bathymetric survey indicates that rip rap elevations meet design requirements.	Throughout stone placement activities (5/10 to 06/20/2016)	Ramboll Environ
4. A grain rye seed mix was added to the original approved seed mix for Site restoration, the Ernst Conservation Seeds Company Native Upland Wildlife Forage and Cover Meadow Mix (ERNMIS-123), to provide vegetative cover for erosion and sediment control while native grasses are being established. The grain rye seed mix was recommended by the seeding company and was applied at a rate of 30 lbs. per acre. The original seed mix was specified in Submittal #5.3 (Vegetation Protection Plan).	7/12/2016	EPA
5. Rather than using ¼" filler rods for vertical and overhead welds, as indicated in Submittal #7.2 (Waler Repair Sequence and Procedures), 5/32" or 1/8" rods were used (Section 5.4).	6/7/2016	RA Consultants
6. The clamshell bucket on the crane was switched to a grapple attachment since the bucket could only pick up one or two R6 stone pieces at a time. The use of a crane with a clamshell bucket was indicated in Submittal #3.3 (Sequence of Work and Construction Schedule).	5/20/2016	Ramboll Environ
7. The disposition of the crushed stone and associated fines was not defined prior to the start of construction. The crushed stone and associated fines that remained on the upland area after stone placement was completed were placed on top of the completed stone berm during periods in the tidal cycle when the top of the stone berm was above water. No significant amount of crushed stone remained in the upland area after demobilization (Section 5.3).	6/27 and 6/28/2016	EPA

Table 3: Field Changes to Design

Design Change	Daily Report	Approved By
8. To improve the waler repair specified in Submittal 7.2 (Waler Repair Sequence), a steel plate was installed between the W sections and the waler channels to help reduce forces imposed on the channel flanges of the waler and minimize the risk of bending the flanges. The W sections and the plate were welded onshore prior to placement (Section 5.4).	6/9/2016	RA Consultants
9. The reach of the long-reach excavator was insufficient to place the R6 stone from the heights specified in Submittal #3.3 (Sequence of Work and Construction Schedule), which required stone placement within 1 to 2 feet from the bottom for the first stone layer or 2 to 3' from the previous layer. Stone placement with the excavator was performed at a height of approximately 5.5 feet from the top of the sheetpile wall; CEI used a tape measure to monitor the height of the excavator bucket during stone placement in lieu of putting incremental markings on the stone placement equipment (Section 5.3).	5/11 through 5/25/2016 – field approval No exceedances of the turbidity performance criteria were noted.	EPA
10. CEI burned six holes, each approximately the size of a quarter (approximately one-inch diameter), on the sheetpile wall to install wooden float stages for the dock workers to stand on during waler repair. These float stages were used in place of the originally proposed sand bags and wooden platform. These holes were repaired as part of the waler repair activities. (Section 5.4).	5/20/2016	RA Consultants
11. Individual shims were used at the top and bottom points of contact between the waler and the sheetpile wall, rather than one solid shim as indicated in Submittal #7.2 (Waler Repair Sequence and Procedures)(Section 5.4). Shims were welded together.	6/17/2016	RA Consultants
12. Tie-rod location T-9 was tested in place of T-2/T-3 (Section 5.5).	6/29/2016	RA Consultants

Table 3: Field Changes to Design

Design Change	Daily Report	Approved By
13. The interior corner weld on the waler in the repair area did not achieve full penetration, which is inconsistent with the specifications in Submittal #7.2 (Waler Repair Sequence and Procedures). This was not deemed a material issue since the design load does not rely on the strength of the weld in this location, rather on the strength of the waler members (Section 5.4).	6/17/2016	EPA
14. The western end of the Phase II turbidity curtain configuration and eastern end of the Phase I turbidity curtain configuration were anchored near Target E rather than near Target C, as is indicated in Submittal #11.3 (Turbidity Control Plan). (Section 5.3).	5/27/2016	Ramboll Environ
15. HP8 waler segments were attached to the waler using 5/16" welds on the top and bottom of the HP8 segments at a frequency of 2" every 6" along the length of each segment. The design drawings (Figures 1 through 4) had specified continuous welds. (Section 5.4).	06/17/2016	RA Consultants

6. LONG-TERM MONITORING

LTM activities at the Site will follow the previously-established LTM work plan, which includes sheetpile wall monitoring and vegetation surveys of the engineered cap. Ramboll Environ will prepare a separate addendum to the LTM Plan for EPA's review, detailing the proposed activities and frequencies of this monitoring associated with the repaired sheetpile wall.

7. CONTACT INFORMATION

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8. REFERENCES

Ramboll Environ. 2016. 2015 Long-Term Monitoring Annual Report. Metal Bank Cottman Avenue Superfund Site, Philadelphia, PA. March.

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FIGURES

APPENDIX A
EPA-APPROVED DESIGN PACKAGE AND SUBMITTALS

Submittal Number	Submittal Description
2	Certificate of Insurance
3.3	Sequence of Work and Construction Schedule
4	Health and Safety Plan
5.3	Vegetation Protection Plan
6.3	Materials
7.2	Waler Repair Sequence and Procedures
8.2	Waler Repair Shop Drawing
9.3	Monitoring Plan
10.2	Riprap Elevation Survey Plan
11.3	Turbidity Control Plan
12	Tie-Rod Testing Qualifications

APPENDIX B
BASELINE SURVEY, CONSTRUCTION MONITORING, AND AS-BUILT DRAWINGS

APPENDIX B-1
AS-BUILT SURVEYS

APPENDIX B-2
BASELINE SURVEYS

APPENDIX B-3
TURBIDITY MONITORING

APPENDIX B-4
SHEETPILE WALL MONITORING

APPENDIX C
PHOTOGRAPHIC LOG

APPENDIX D
RAMBOLL ENVIRON DAILY REPORTS

APPENDIX E
WALER REPAIR AND TIE-ROD TESTING RECORDS

APPENDIX E-1
TIE-ROD TESTING AND EQUIPMENT CALIBRATION RECORDS

APPENDIX E-2
WELDER QUALIFICATIONS

APPENDIX E-3
OTHER DOCUMENTATION

APPENDIX F
ROCK AGGREGATE MATERIAL TRACKING RECORDS

APPENDIX F-1
ROCK AGGREGATE MATERIAL TRACKING LOG

R6 STONE

CRUSHED STONE

APPENDIX F-2
ROCK AGGREGATE MATERIAL DELIVERY TICKETS

R6 STONE

CRUSHED STONE

APPENDIX G
WASTE DISPOSAL RECORDS

APPENDIX H
COMMUNICATION RECORDS FOR DESIGN CHANGES

DESIGN CHANGE 1 AND 2 CORRESPONDENCE

DESIGN CHANGE 4 CORRESPONDENCE

DESIGN CHANGE 5 CORRESPONDENCE

DESIGN CHANGE 7 CORRESPONDENCE

DESIGN CHANGE 8 CORRESPONDENCE

DESIGN CHANGE 10 CORRESPONDENCE

DESIGN CHANGE 11, 13, AND 15 CORRESPONDENCE

DESIGN CHANGE 12 CORRESPONDENCE